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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/942,764	08/31/2001	Satoru Hosono	Q66059	9203

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EXAMINER
MOUTTET, BLAISE L

ART UNIT	PAPER NUMBER
2853	

DATE MAILED: 11/16/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/942,764	HOSONO ET AL.	
	Examiner	Art Unit	
	Blaise L Mouttet	2853	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *01 November 2004*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-44* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-14,16,17,23-26,30-32,34,35 and 37-44* is/are rejected.

7)☒ Claim(s) *15,18-22,27-29,33 and 36* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *06 December 2001* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

1. Claims 1, 2, 4, 6, 7, 9, 13, 14, 16, 17, 23-26, 31, 34, 35, 37-39, 43 and 44 are rejected under 35 U.S.C. 102(e) as being anticipated by Anderson et al. US 6,116,717.

Anderson discloses, regarding claim 1, a method of manufacturing an inkjet recording head (figure 1) which includes a plurality of nozzle orifices forming at least one nozzle row, pressure chambers (nozzle chambers) each communicated with the associated nozzle orifice, pressure generating elements (heaters) each generating pressure fluctuation in ink provided in the associated pressure chamber to eject an ink droplet from the associated nozzle orifice (column 3, lines 7-16, column 1, lines 16-25), the method comprising the steps of:

assembling the ink jet recording head (necessary to provide the product as shown in figure 1);

executing a plurality of ink drop ejections (figure 3, step 168, figure 4, step 176) from the nozzle orifice while varying ejecting time duration as ejecting conditions (figure 3, steps 166 and 174, figure 4, step 182) to measure corresponding ejected amounts of

ink droplets (figure 3, step 170) and corresponding ejection speeds (figure 4, step 178) as ejecting results;

identifying a correlation between ejecting conditions and ejecting results based on the plurality of ink droplet ejections as shown and described in relation to figures 3 and 4, steps 172 and 180; and

classifying the assembled recording head into one of a plurality of ranks based on the identified correlation as shown and described in relation to figure 4, step 184 and column 2, lines 56-63.

Regarding claims 2 and 4, the step of executing the ink droplet ejections includes the steps of:

supplying an evaluation signal including at least an excitation element which excites the ink pressure fluctuation (as shown and described as the waveform t_2 in figure 7) and an ejection element which follows the excitation element to eject the ink droplet from the nozzle orifice (as shown and described as the waveform t_4 in figure 7); and

measuring an ejected amount and ejection speed of the ink droplet at plural times as the ejecting results while varying a time period (t_3) between a termination end of the excitation element and an initial end of the ejection element as the ejecting conditions (column 5, line 59 - column 6, line 2).

Regarding claims 6, 7, 38 and 39, excitation pulse t_2 is less than half of the period of the main pulse (natural period) as indicated in the resultant total row of the Table in column 7.

Regarding claim 9, the classified rank is indicated on the assembled print head by means of a memory device placed on the assembled recording head (column 5, lines 41-43).

Regarding claims 13 and 31, electrical memory is used to store the ranks (column 5, lines 41-43, column 3, lines 3-6).

Anderson et al. discloses, regarding claim 14, a method of driving the inkjet recording head comprising:

providing a rank indicator (i.e. the electronic memory) which indicates one of the ranks (pulse widths) classified (column 5, lines 41-43);

providing a drive signal including wave elements having a control factor defined in accordance with the classified rank as shown and described in relation to figure 7 and figure 5, step 192; and

supplying the drive signal to the pressure generating element as shown and described in relation to figure 5, step 194.

Regarding claims 16 and 23, a characteristics changing elements which change mass and velocity of the ink drops ejected by the drive signal is described in relation to column 5, line 46 - column 6, line 2.

Anderson et al. discloses, regarding claim 17, the inkjet recording head (figure 1) and a waveform controller (firing electronics) as described in relation to column 6, lines 3-25.

Regarding claim 24, the expansion element corresponds to the waveform defined by (t_2) and the ejection element corresponds to the waveform defined by (t_4) as described in relation to column 5, lines 59-66.

Regarding claim 25, the potential difference (i.e. amplitude) of the expansion and ejection elements are defined by the waveform controller (firing electronics) (figure 7, column 5, lines 46-48).

Regarding claim 26, the expansion element corresponds to the waveform defined by (t_2), the holding element corresponds to the waveform defined by (t_3) and the ejection element corresponds to the waveform defined by (t_4) as described in relation to column 5, lines 59-66.

Regarding claim 34 and 37, the pressure generating element is a heater (column 1, lines 56-60).

Regarding claims 35 and 43, the memory device of column 5, lines 41-43 corresponds to the rank indicator.

Regarding claim 44, correlations between drop mass and velocity measurements are used to derive the pulse offsets stored in the memory as discussed in relation to figures 3 and 4.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the

> invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

2. Claim 3 is rejected under 35 U.S.C. 103(a) as being unpatentable over Anderson et al. US 6,116,717 in view of Milbrandt US 4,631,548.

Anderson et al. discloses the limitations of claims 1 and 2 as described in the 35 USC 102 rejection above.

Anderson et al. discloses, regarding claim 3, that the time period includes a first time period (t_3) which is determined such that the ink ejection becomes optimum when a natural period is per a designed criteria, a second time period (t_2) shorter than the first time period and a third time period (t_4) longer than the first time period (column 7, lines 34-50).

Anderson et al. fails to disclose that the optimal ejected ink amount is a minimum ink volume.

Milbrandt teaches the desirability of small ink volumes for optimum clarity and sharpness of an image (abstract, column 1, lines 64-68).

It would have been obvious to a person of ordinary skill in the art at the time of the invention to utilize a minimum ink volume as the optimum ink amount of Anderson et al. as suggested by Milbrandt.

The motivation for doing so would have been to achieve clarity and sharpness of a printed image as taught by column 1, lines 64-68 of Milbrandt.

3. Claim 5 is rejected under 35 U.S.C. 103(a) as being unpatentable over Anderson et al. US 6,116,717 in view of Jacobs et al. US 4,704,675.

Anderson et al. discloses the limitations of claims 1 and 4 as described in the 35 USC 102 rejection above.

Anderson et al. discloses, regarding claim 5, that the time period includes a first time period (t_3) which is determined such that the ink ejection becomes optimum when a natural period is per a designed criteria, a second time period (t_2) shorter than the first time period and a third time period (t_4) longer than the first time period (column 7, lines 34-50).

Anderson et al. fails to disclose that the optimal ejected ink amount is a minimum ink speed.

Jacobs et al. teaches the desirability of small ink velocities in the attainment of uniform velocity ink ejection arrays (column 1, lines 34-38, column 5, line 44-49).

It would have been obvious to a person of ordinary skill in the art at the time of the invention to utilize a minimum ink velocity in the optimum ink ejection of Anderson et al. as suggested by Jacobs et al.

The motivation for doing so would have been to assure uniformity in ink ejection between nozzles in the array as taught by column 1, lines 34-38 of Jacobs et al.

4. Claims 8 and 30 are rejected under 35 U.S.C. 103(a) as being unpatentable over Anderson et al. US 6,116,717 in view of Nagoshi et al. US 6,224,182 and Jacobs et al. US 4,704,675.

Anderson et al. discloses classifying the assembled recording head into a plurality of ranks as explained regarding the 35 USC 102 rejection of claims 1 and 14.

Anderson et al. fails to disclose that the plurality of ranks include a first rank indicating a natural period based on a design criteria, second and third ranks respectively shorter and longer than the designed criteria and a fourth rank indicating an erroneous condition.

Nagoshi et al. discloses classifying assembled recording heads into a plurality of ranks (column 4, lines 39-48, column 4, lines 57-65) in which pulse widths are chosen to be a first rank associated with a nominal ejection period (rank 7) or other ranks based upon shorter or longer ejection periods (column 13, line 41 - column 14, line 9 and column 19, lines 16-30).

Jacobs et al. discloses classifying a recording head as a faulty head if an erroneous condition is determined (figure 6, column 5, lines 44-45).

It would have been obvious to a person of ordinary skill in the art at the time of the invention to include the ranks of Nagoshi et al. in the classification procedure of Anderson et al.

The motivation for doing so would have been that finer ranks allow for higher precision classification of the recording head as suggested by column 19, lines 15-29 of Nagoshi et al.

It would have been obvious to a person of ordinary skill in the art at the time of the invention to include the erroneous condition rank as suggested by Jacobs et al. in the classification procedure of Anderson et al.

The motivation for doing so would have been in order to maintain quality control on the recording head production as suggested by column 5, lines 44-45 of Jacobs et al.

5. Claims 10-12, 32 and 40-42 are rejected under 35 U.S.C. 103(a) as being unpatentable over Anderson et al. US 6,116,717 in view of Arthur et al. US 5,049,898.

Anderson et al. discloses the limitations of claims 1, 9, 17 and 35 as described in the 35 USC 102 rejection above.

Anderson et al. discloses the utilization of a memory device (rank indicator) to store the head rank information (column 3, lines 29-32).

Anderson et al. fails to disclose that the memory device is indicated by a symbol indicating a combination of the ranks of the nozzle rows which is readable by an optical reader.

Arthur et al. teaches that a bar code symbol indicating a combination of ranks of nozzle rows and which is readable by an optical reader is an art recognized equivalent to the memory device as taught by Anderson et al. (column 3, lines 4-16, column 6, lines 32-38).

It would have been obvious to a person of ordinary skill in the art at the time of the invention to utilize an optically readable bar code as taught by Arthur et al. as the memory device of Anderson et al.

The motivation for doing so would have been to easily identify the operational characteristics of the print head as suggested by column 6, lines 32-40 of Arthur et al.

Allowable Subject Matter

6. Claims 15, 18-22, 27-29, 33 and 36 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Response to Arguments

7. The applicant's arguments entered November 01, 2004 have been fully considered but are not persuasive.

The applicant has argued that the limitation of "executing a plurality of ink droplet ejections from the nozzle orifice, while varying an ejecting time duration as ejecting conditions to measure either corresponding ejected amounts of ink droplets or corresponding ejected speeds as ejecting results" is not disclosed by Anderson et al. '717. The examiner strongly disagrees.

Initially the examiner notes column 6, line 60 – column 7, line 11 of Anderson et al.

Next, the nozzles are fired on the drop mass measurement apparatus using the adjusted pulse widths from the previous steps. The values for mass are 35 nanograms maximum, 28 nanograms nominal and 22 nanograms minimum. This particular print head measured an average drop mass for one section of 32 nanograms. Since this number is higher than the desired nominal value of 28 nanograms, the fire pulse should be adjusted. To effectively eject the droplet from the nozzle chamber, the total energy delivered to the ink must not be less than the 4.6 microjoules discussed above. The drop mass, however, can be adjusted by changing the distribution of the energy between the pre-heat pulse and the main pulse. Thus, for this print head subsection with a measured mass 4 nanograms above nominal, we shift 0.1 microseconds from the main pulse to the pre-heat pulse, keeping the total energy delivered constant and decreasing the mass of the ejected droplets. This information will be stored in the table as a –2 delta count for the main pulse and a +2 delta count for the pre-heat pulse.

This section of Anderson explicitly indicates that the pulse width duration is adjusted (i.e. varied) during drop mass (i.e. ejecting amount) measurement. Anderson further goes on to explain that these adjustments are used in the velocity measurement (column 7, lines 12-33) and the pulse width is again adjusted. This is clearly in contrast to applicant's allegation that the ejecting conditions of Anderson are held constant during the measurement of ejecting amounts and speeds.

The applicant points to column 4, lines 54-56 of Anderson to support their allegation, which states that "Once the resistance adjustments have been made, the electrical process variations are no longer a variable in consistency of drop production."

However "the electrical process variations" are not referring to variations of the ink ejection pulse width but to variations in resistance characteristics of the printhead, which is clear when this section of Anderson is read in context.

The examiner has considered the applicant's arguments that Anderson performs optimization whereas applicant's invention performs ranking. However the examiner disagrees that this difference is expressed in the rejected claims since there is no exclusion to optimization in the claims and Anderson explicitly teaches characterizing the recording head with customized information (column 2, lines 56-63), which is seen to be equivalent to classifying into ranks.

Conclusion

8. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Contact Information

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Examiner Blaise Mouttet who may be reached at telephone number (571) 272-2150. The examiner can normally be reached on Monday-Friday from 8:30 a.m. to 5:00 p.m.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Stephen Meier, Art Unit 2853, can be reached at (571) 272-2149. The fax phone number for the organization where this application or proceeding is assigned is (703) 872-9306.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0956.

Blaise Mouttet November 12, 2004

Blaise Mouttet 11/12/2004

LAMSON NGUYEN
PRIMARY EXAMINER
11/13/04